

Calculating magnification

I can use the magnification relationship, convert units and judge whether an answer is plausible.

Notice. Recall. Be ready to explain.

- 1 Write the relationship between image size, actual size and magnification.
- 2 How many micrometres are in 1 millimetre?

The diagram shows a yellow bar representing 1 mm, divided into 1000 equal segments. Below it, a horizontal line with two purple dots represents 1000 μm . The text below the line reads: "match units $\rightarrow$ divide image by actual $\rightarrow$ check scale".

Retrieval answers

Make a prediction

A cell is 50 μm long but its image measures 50 mm. Is the magnification $\times 1$, $\times 100$ or $\times 1000$? Commit before converting.

A $\times 1$

B $\times 100$

C $\times 1000$

Commit, then check

Watch the model

- 1 Circle the known quantities and name the unknown.
- 2 Convert both lengths into the same unit before substituting.
- 3 Use magnification = image size ÷ actual size, then check whether the scale makes sense.

Use matching units

$$M = \frac{\text{IMAGE SIZE}}{\text{ACTUAL SIZE}}$$

View labelled diagram

Optional video

Choose and justify

An image is 24 mm and the actual cell is 60 μm . Which conversion is useful?

A 24 mm = 24 μm

B 24 mm = 240 μm

C 24 mm = 24,000 μm

D 60 μm = 60,000 mm

Give the deciding clue before checking.

Check the reasoning

Connect the science

- 1 Rearrange only after naming the unknown.
- 2 Keep units beside substitutions so a mismatch stays visible.
- 3 A plausibility check asks whether the image is much larger than the actual cell.

Match units before dividing

$$1 \text{ mm} = 1000 \text{ } \mu\text{m} = 1,000,000 \text{ nm}$$

$$M = I \div A ; I = M \times A ; A = I \div M$$

M is a ratio. I and A are lengths.

Choose the relationship

Work in pairs: one chooses the formula; one checks the units. Swap.

- 1 A Image 20 mm; actual 0.1 mm. Find M.
- 2 B Image 50 mm; actual 0.5 mm. Find M.
- 3 C $M = \times 400$; actual 0.05 mm. Find image size.

Reveal shared reasoning

Your independent evidence

A micrograph of a cell measures 36 mm. The cell's actual length is 90 μm . Calculate the magnification and explain one check that shows your answer is plausible.

Optional support

1. Name the missing value. 2. Match the units. 3. Choose $M = I \div A$, $I = M \times A$ or $A = I \div M$. 4. Show each line of working.

Make one precise correction to the same work after feedback.

[Open worksheet pages](#)[Model after first attempt](#)

What changed in your thinking?

What single check should happen before dividing one length by another?

- 1 Point to one improvement in your work.
- 2 Choose what you want to revisit.
- 3 Tell your teacher; agree the next step together.

Retrieval and prediction check

1 $M = I \div A$ (also $I = M \times A$).

2 $1000 \mu\text{m}$.

$\times 1000$

[Return to Starter](#)

Check the deciding clue

$$24 \text{ mm} = 24,000 \text{ }\mu\text{m}$$

Correct. Now divide 24,000 μm by 60 μm .

Compare your reason. Correct one step if needed.

[Return to We Do](#)

Our shared reasoning

A: $20 \div 0.1 = \times 200$.

B: $50 \div 0.5 = \times 100$.

C: $400 \times 0.05 = 20 \text{ mm}$.

Keep units for lengths; magnification is a ratio.

[Return to shared task](#)

Compare after your first attempt

36 mm = 36,000 μm . Magnification = image size $\div$ actual size = $36,000 \div 90 = \times 400$. This is plausible because the measured image is hundreds of times larger than the actual cell.

Use the model to improve your explanation in your own words.

[Return to independent task](#)

Your lesson resources

Worksheet pages are stored inside this PowerPoint.

[Worksheet · page 1](#)[Worksheet · page 2](#)[Standard PDF](#)[Supported PDF](#)[Depth PDF](#)[Editable Word worksheet](#)[Open online lesson / model](#)

Named files are in this week's folder. Online lesson and video need internet.

[Optional concept video](#)

Worksheet · page 1

Use your printed copy.
Keep the first attempt.

MADE BY MATT / LAUNCH SCIENCE

W3L2 | Calculation relay — without a race

Wednesday | 09:30–10:10 | Explore | Editable pupil sheet

Name: _____ Date: _____

Core first. Write, speak, point or dictate your own words. Keep the first attempt so you can improve it.

Optional support: 1. Name the missing value. 2. Match the units. 3. Choose $M = I \div A$, $I = M \times A$ or $A = I \div M$. 4. Show each line of working.

Work together

Work alone or in a pair. One person chooses the relationship; the other checks the units. Swap for the next item.

1. **A. Image = 20 mm; actual = 0.1 mm. Calculate magnification.**

2. **B. Image = 50 mm; actual = 0.5 mm. Calculate magnification.**

Return to task

Worksheet · page 2

Continuation is optional.
Improve the same work.

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W3L2 | Continue and improve

Use after the core questions when directed

3. C. Magnification = $\times 400$; actual = 0.05 mm. Calculate image size.

4. D. Image = 30 mm; magnification = $\times 600$. Calculate actual size.

5. E. Image = 25 mm; actual = 50 μm . Calculate magnification.

6. F. Put nm, μm and mm in order from smallest unit to largest.

Optional transfer

What happens to M if only the printed image length doubles?

Depth: name an assumption or limit, then say what evidence would strengthen your answer.

Improve the same work

One correction I made, and why:

My request for next time: _____

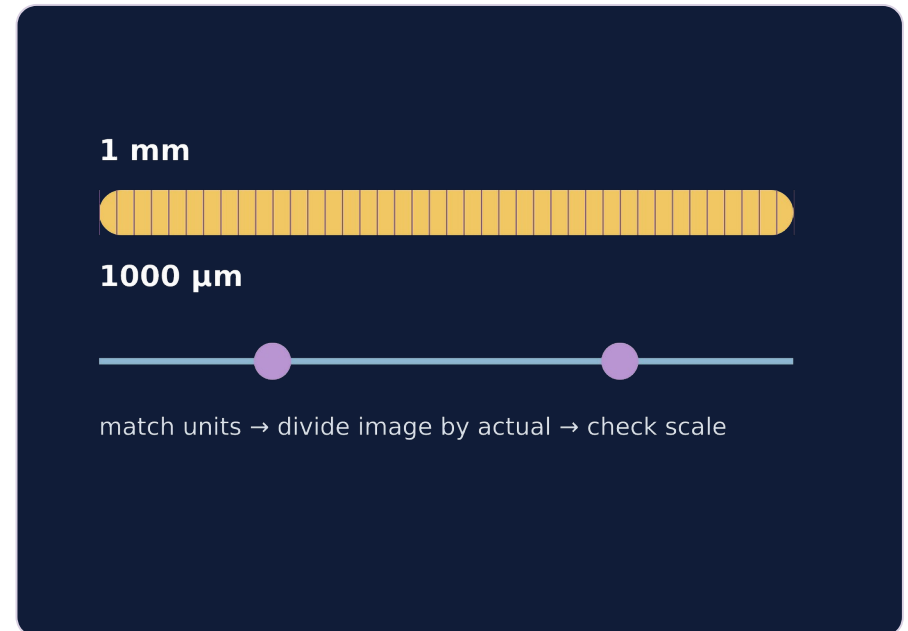
Return to task

Watch, pause and explain

Microscopy

What is the difference between making an image bigger and resolving more detail?

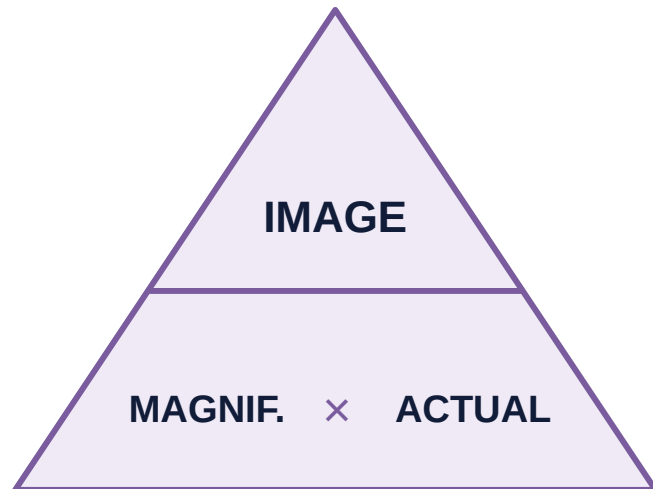
[Play freesciencelessons video](#)



No connection? Use the still model and explain the same question.

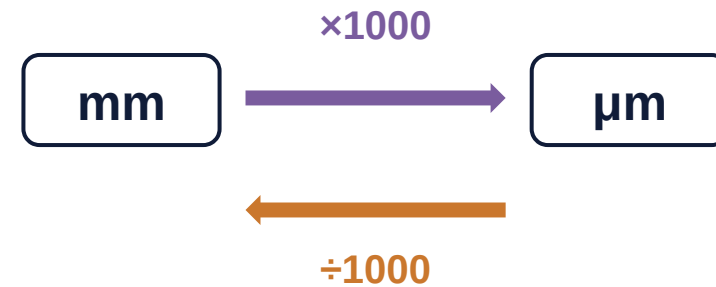
Look closely at the model

The magnification triangle



cover the one you want, read the rest

mm ↔ μm conversion



match the units BEFORE you divide

A model illustration: use the stated data for calculations.

Return to I Do